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SCIENCE NEWS-LETTER

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May 25, 1929



THE FLYING WINDMILL

Flying's Father Inspects America's First Autogiro
(See page 318)

Vol. XV

No. 424

American Autogiro

Aeronautics

America's first autogiro, that strange-looking craft that the Spaniard, de la Cierva, has invented, paid a courtesy call to Langley Field, Va., when the Fourth Annual Aircraft Engineering Research Conference of the National Advisory Committee for Aeronautics was held there on May 14.

In the cover photograph (at the left) Orville Wright, the first man to fly, is talking to H. F. Pitcairn, American airplane manufacturer and pilot of the first of this new breed of aircraft to fly in America. Incidentally in flying from Philadelphia to Langley Field, via Washington, a distance record for the autogiro was set.

The autogiro is not a true airplane. It is not a helicopter. It has been called a flying windmill. Instead of the conventional wings of an airplane, there are four narrow wings at right angles to each other that revolve in a nearly horizontal plane on a vertical axis. This revolving rotor structure is not connected in any way with the engine and is turned by the force of the autogiro's movement through the air. The revolving wings provide the lift that keeps the autogiro aloft.

Climbing steeply and descending nearly vertically without disaster are advantages claimed for the autogiro. It does not stall in same manner as the ordinary airplane. It is aerodynamically stable at lower speeds and does not have as high top speeds as the usual airplane.

The first of the autogiros was built in 1919 and since then some forty machines have been built and flown. The inventor, Señor Juan de la Cierva, is expected to visit America for the first time in a few months.

For a discussion of the principles underlying the new sorts of heavier-than-air craft, including the autogiro, see the SCIENCE NEWS-LETTER for March 24, 1928, page 179.

Science News-Letter, May 25, 1929

Coal deposits that appear to be the most important in North Africa have been discovered in Morocco.

It is estimated that farmers in 1927 averaged \$1,290 net income, as compared with \$1,133 in 1926.

Young bats, past babyhood, are "hung up" by their hooked claws while their mother goes out to hunt for food at night.

Storing of Memories Important

Psychology

A new science—memory dietetics—would be far from an absurd proposal, according to Dr. John M. Fletcher, director of psychological study at the behavior clinic recently opened at Tulane University.

Memories that a child stores in his mind and that leave him in a state of mental and emotional indigestion are one of the most serious problems that the clinic has to deal with.

"Here comes into the clinic a child who is showing conduct disorders of various sorts, selfishness, stealing, truancy," said Dr. Fletcher. "Here is another with an obsession that is undermining his health and leading toward mental disease. Another has a chronic speech defect that points to a hampered career of suffering. Behind them all there is likely to be found an accumulation of pathogenic memories.

"The child can no more get rid

of an experience by forgetting it than he can get rid of something unwholesome by swallowing it. Memories, like food, are absorbed or assimilated. Some food cannot be satisfactorily digested. Likewise, we cannot adjust ourselves to some memories.

"That memories may relate to the cause and nature of disease is a discovery of modern psycho-pathology, which may be found equally as important as the germ theory of physical disease. The child guidance clinics are an outgrowth and a practical application of this discovery, in that they assume a definite causation for a child's maladjustment to his surroundings, and they attempt to trace the conditions to these specific causes with a view to ultimate relief."

Science News-Letter, May 25, 1929

In This Issue—

Oil in airplanes, p. 319—Nitric acid forming gas responsible, p. 319—Missing link in the Calendar, p. 321—Successful eclipse, p. 323—What to do for poison ivy, p. 323—Where \$ came from, p. 324—Mental disorders, p. 325—Horizontal rainbows, p. 329—Topsy-turvy space, p. 329—Traffic in France, p. 328—Uses of static, p. 327—Porous matter, p. 330—Books, p. 331.



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INTERPRETING week by week the latest developments in the various fields of science, this magazine attempts also to present its articles in the most pleasing and readable typography and the most convenient arrangement.

The clippability, indexing, and automatic dating of each article are unique features.

This is a separable magazine. Each original article can be clipped or torn out without losing or damaging another important article on the other side. These original articles are backed by reprinted quotations or excerpts, short one-sentence items, advertisements, and other material not likely to be clipped and preserved.

Each article is automatically indexed by the key word printed in italics just below the heading, or at the end of the article when the article has no heading. Articles can thus be filed easily into any system of classification, whether it be Library of Congress, Dewey, or one of the reader's own devising.

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All of the resources of Science Service, with its staff of scientific writers and correspondents in centers of research throughout the world, are utilized in the editing of this magazine.

Oil Burning Airplanes for Future

Aviation

America's first Diesel or oil-fueled airplane engine which flew from Detroit to Langley Field for its first public inspection by leading aeronautical experts may be the first of a new breed of aeronautical power plants that may drive the gasoline-carburetor sort of engine out of the sky.

For several years the Packard engineers under the direction of Capt. L. M. Woolson have been developing the new engine that has just been allowed to perform in public. The ordinary person would not give it a second glance, so conventional does it seem in outward appearance. But to the engineer who has seen Diesel engines capture the propulsion of sea-going ships from steam turbines, who has watched the application of oil engines to power plants and sizable construction machinery, who has even seen the coming of Diesel powered automobile trucks, the Packard engine consuming the sort of oil that



CAPT. L. M. WOOLSON, Packard engineer, under whose direction the oil-burning engine has been perfected, as he appeared at Langley Field after flying from Detroit in one of his planes.

is burned in furnaces and driving a standard type airplane for six hours across country comes as a portent.

Little wonder then that the pilots, research scientists and airplane manufacturers visiting the Langley Memorial Aeronautical Laboratory crowded around the Packard engine when its locked covers were unfastened.

Nine cylinders, air cooled, arranged radially, compose the Packard airplane engine. The familiar spark plugs and the carburetor so necessary on a gasoline engine are lacking. One valve in each cylinder head acts as air inlet and burned fuel exhaust. The fuel, oil instead of gasoline, is sprayed into the cylinder instead of being mixed with air and vaporized in a carburetor. The heat of compression of the squeezed air in the contracting cylinder ignites the oil sprayed into it. Thus electrical ignition is dispensed with. The engine is of the four-stroke type and operates at from (Turn to next page)

Nitric Acid Forming Gas Spread Death

Chemistry

Nitrogen oxide, reddish brown corrosive gas that is first cousin to nitric acid, was the deadly substance that spread disaster in the Cleveland Clinic explosion, in the opinion of explosive experts. When the mass of X-ray film stored in the basement exploded and burned in its confined quarters it gave off great volumes of at least two dangerous gases, nitrogen oxide and carbon monoxide. The explosive sort of photographic film is made of cellulose nitrate and is practically identical in composition with smokeless powder. Such films have been known to explode spontaneously on various occasions in the past and they can be easily ignited.

The most probable explanation of the cause and progress of the explosion was given by Dr. Charles E. Munroe, veteran chief explosives chemist of the U. S. Bureau of Mines, who is the inventor of the smokeless powder used by the Navy and who has investigated all the major explosion accidents of the past four decades. Basing his figures upon smokeless powder explosion experiments made at Edgewood Arsenal to ascertain the cause of powder disasters on Navy ships, Dr. Munroe

explained that within less than a half minute after the explosion of photographic film the resulting gases must have been composed of over a third deadly carbon monoxide and about a tenth of corrosive nitrogen oxide. These gases, produced in large quantities, spread through the building. The secondary explosion was probably due to the ignition of an explosive mixture of the carbon monoxide with air.

Three forms of nitrogen oxide result from the burning of cellulose nitrate. First a colorless, harmless gas, nitric oxide, composed of equal parts of nitrogen and oxygen (NO), is given off, but this on contact with air oxidizes to the reddish brown active gas, nitrogen dioxide, which is composed of one atom of nitrogen united to two atoms of oxygen. Mixed with the nitrogen dioxide is another form of the same compound, nitrogen tetroxide, similar in color and evil properties and containing two atoms of nitrogen combined with four of oxygen. Nitrogen dioxide mixed with water forms nitric acid, one of the most vigorous of the acids.

Carbon monoxide is the colorless, odorless gas that is responsible for

deaths when auto engines are allowed to run in closed garages. It is the product of any sort of incomplete combustion. How much damage can be attributed to it in the Cleveland Clinic disaster is problematical.

Bromine was blamed in early newspaper reports for the damage but experts can not see how it could have been present except in very small quantities in chemical laboratories. The nitrogen oxide gases look very much like bromine fumes and the effect on the victims is similar. Erroneous reports of the presence of phosgene, a colorless war gas, were flatly repudiated by chemical warfare authorities and the confusion probably arose in the minds of observers whose experience with gas attacks was obtained in the war. No war gases were stored in the Cleveland Clinic.

Science News-Letter, May 25, 1929

A strange provision of nature protects the knob-cone pine of the Pacific coast: seeds of the cones are rarely discharged until the tree has been destroyed by a forest fire, when the heat liberates the seeds to establish new growth.

Oil-Burning Airplane Perfected—Continued

1700 to 2000 revolutions per minute with cylinder pressures as high as 1200 pounds per square inch.

For a given mileage the fuel cost is only about a sixth that of a gasoline fueled engine. The present design weighs about three pounds per horsepower, a remarkable record despite the fact that standard gasoline airplane engines weigh less than two pounds per horsepower. Engineers have estimated that for long flights the saving in fuel weight due to the use of oil instead of gasoline will make the Diesel engines more economical despite its heavier weight.

Starting a Diesel engine presents more difficulties than for a gasoline engine. Since the firing of the fuel mixture in the cylinder is accomplished by the heat of compression of the air, a much swifter kick must be given in starting. While the exact method of starting the Packard engine is not yet revealed, those who

saw the Langley Field demonstration are of the opinion that the necessary impulse is given by the firing of a powder cartridge. Once the engine is warmed by running it can be stopped and started in the more conventional manner.

In the laboratory of the National Advisory Committee for Aeronautics at Langley Field a Diesel-type airship engine of six cylinders is now operating under test conditions. An ordinary airship carburetor-type gasoline engine was converted to burn oil as a result of the investigations on one cylinder oil engines that have been in progress for several years. This development will speed the application of oil engines to airships and possibly to automobiles.

The British are developing oil Diesel-type engines for their large airships now building. The Beardmore engineers in England have also given attention to the possibilities of

oil-powered airplane engines. In Germany and France similar work is in progress, although details are lacking because of the secrecy that surrounds all investigations.

More than 4000 Diesel engines for power and other purposes are now being manufactured in the United States annually. Most of them are heavy in weight and over a hundred horsepower. The principle of the oil engine was invented by Dr. Rudolf Diesel, the German engineer-physicist, after which it is named. Dr. Diesel's death is still a mystery, as he disappeared from a cross-channel steamer en route to England just before the outbreak of the European war.

Science News-Letter, May 25, 1929

Abyssinia's desire for an outlet to the sea has at last been satisfied through an arrangement with Italy to lease for 130 years a piece of land for a port on the Red Sea.

The Pageant of Astronomy

Astronomy

WILLEM J. LUYTEN, in *The Pageant of the Stars* (Doubleday, Doran):

Man cannot live by faith alone. Surrounded as he is by a world of facts, he seeks knowledge and understanding of these facts. On a knowledge of facts, however imperfect, man must build the superstructure of faith. His knowledge represents his determination to be fully conscious of the material universe; his faith represents his desire to be at peace with the spiritual universe. Civilization is man's effort to achieve such knowledge and to attain such faith. In the pursuit of these ends astronomy plays a unique and significant part, since it is the only science that deals with the material reality outside this earth.

Astronomy was born out of wonder at the mystery of the dark and starlit night, wonder at the countless host of stars, so familiar and yet so remote; that wonder which Plato called the soul of science. Emerging from this primitive wonder, astronomy has matured down the centuries, widening its scope as man's mind turned from itself to press on in its bold and undeterred quest of the boundaries of his universe, boundaries which have now receded so far that his knowledge of fact and his exercise of faith unite to set his finiteness in infinity.

Consequently, advance in astron-

omy is a phase of the advance of civilization—as man's outlook grew less parochial astronomy progressed from an anthropocentric to a geocentric point of view. At this stage it was sufficiently dominated by the authority of Aristotle, lingering throughout the Middle Ages, and by ecclesiastical interpretation of the Scripture, to postpone all further development until the general intellectual awakening of the Renaissance. It is no mere coincidence, therefore, that we find the formulation of the new truth in astronomy taking place simultaneously with the struggle for new ideas in religion. In 1512 Copernicus first published his views on the rotation of the earth and the central position of the sun in the planetary system—five years before Luther's dramatic gesture at Wittenberg. Copernicus's heliocentric system led to Newton's discovery and demonstration of the principle of universal attraction, and with this first expression of a perfect law of nature it may be said that astronomy came of age as a science. In the meantime the telescope had been invented, and its introduction into astronomy, coupled with Newton's law, entirely changed the aspect of our science. Naked-eye astronomy ceased to exist, the universe became increasingly telescopic, and as a natural consequence astronomy developed into a pure science, thus severing its con-

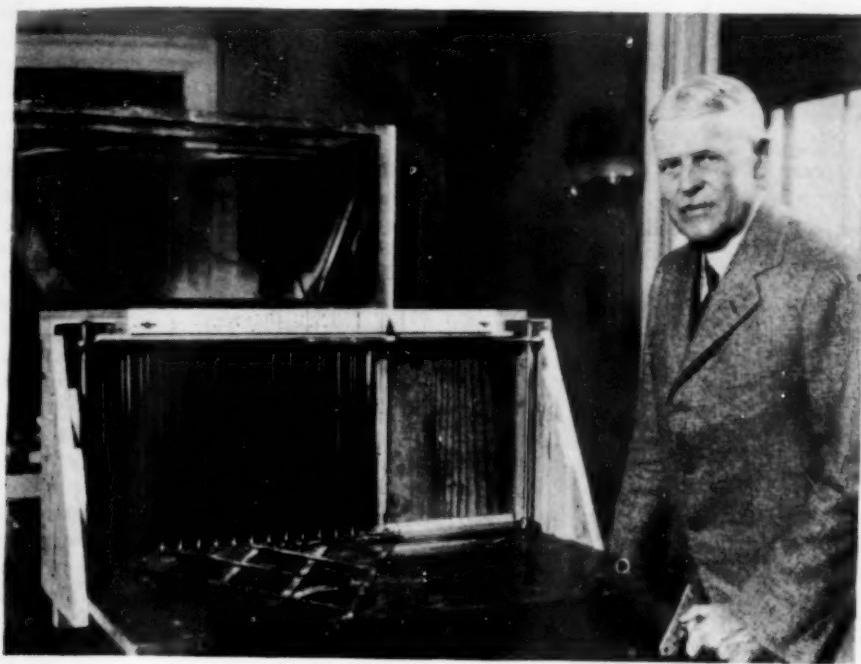
nexion with the theological view of creation. The next century saw the development of celestial mechanics and with it the desire to inquire into the motions of stars and planets; researches into the structure and the mechanism of the cosmos supplanted the former simple description of the visible heavens. Astronomy today is almost exclusively telescopic, the naked-eye stars constitute considerably less than one-millionth part of those that are now visible in our largest telescopes; the discovery of thousands of island universes and the introduction of the doctrine of relativity have entirely changed the concept of space. But in all this tremendous development we find unity: matter is the same everywhere, chemical elements, atoms, and electrons are the same in the stars and nebulae as on the earth, and they obey the same laws everywhere.

Through the introduction of giant telescopes and of photography, and through the application of modern physics and chemistry, new vistas have been opened far beyond the wildest dreams of our predecessors. At the same time, astronomy, though grown more diversified, has yet preserved the unity of its basic truths. Today more than ever before we stand silent in admiration before the truths unveiled by astronomy, before the unity of fact throughout creation.

Science News-Letter, May 25, 1929

Trees May Close Calendar's Missing Link

Archaeology



PROF. A. E. DOUGLASS, with his cycloscope, for analyzing the cycles that appear in tree rings.

By JAMES STOKLEY

The missing link in the history of ancient America may soon be found.

Studies now under way in the southwest may soon make it possible to tell the exact year in which the early dwellers in these regions, who built such structures as Pueblo Bonito in New Mexico, America's oldest apartment house, did their building. In fact, this calendar will be more accurate than our present knowledge of dates in ancient Egypt.

It is from a study of trees and beams that these structures are dated.

An astronomer, Dr. A. E. Douglass, director of the Seward Observatory, and professor of astronomy at the University of Arizona, is in charge of the work.

Beams from one group of ancient buildings have given an accurate calendar back to the year 1260. Another group of timbers have given a sequence of about six centuries of an earlier period. The missing link comes between the close of the six-century period and the year 1260, when the present series began. All that is now needed is to find beams bridging this gap, which is believed to be about 150 years. Then it will be possible to look at any building constructed by the primitive dwellers in the American southwest at any

time since about the year 500 and to tell the date that it was built.

But dating of ancient buildings, though of great importance to the archaeologist, studying the life of these ancient peoples, is not the only thing that may come out of Prof. Douglass' studies. They may go far to revealing new cycles of climate—periods in which floods or droughts may recur—and so help to predict the general weather conditions for years ahead.

The Middle West and South are still suffering from floods. A year or so ago there were extraordinary floods in Vermont, and a few months before that the greatest of all known floods on the Mississippi.

"Were these floods pure accidents in nature's workshop, or did they form part of a series of regular changes which, by careful study, we may be able to predict?" So asks the scientist.

Or again, in Arizona, where Dr. Douglass has done much of his work, there was a great drought from 1899 to 1904, which changed the map of industry in that state. Suppose the coming of that drought had been known beforehand. Then many fortunes might have been saved instead of being lost. Cannot these dangerous climatic conditions be predicted

in some way, so that their costly effects may be avoided? What we need to know in such cases is not the weather of tomorrow or of next week, but that of next year, or 1931, or 1939.

Such predictions must be based on the actual repetition of storm or drought at certain intervals, which are called cycles. Weather cycles are already familiar to all of us. We know that in six or seven months the weather will become colder and another winter will be upon us. Four or five months after that spring will come, and the weather will become warmer again. This is the annual cycle that we call the year. What is needed is a sort of super-year that will tell when to expect particularly bad winters or especially dry summers. A short time ago this very matter was studied at a Cycles Conference held at the Carnegie Institution in Washington, and in which Prof. Douglass played a prominent part.

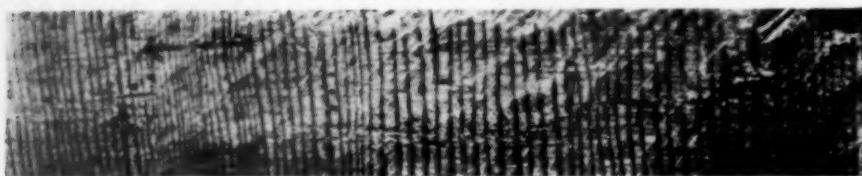
His work has been concerned with the historic background on which other investigators in this field must base their work. For he is showing how the climate has changed in the past, and has invented an ingenious instrument which he calls the "cyclograph" to help make these cycles apparent.

Let Dr. Douglas tell in his own words how this has been determined by a study of the annual rings in trees, especially in the pine trees of the southwestern states, where the continually dry climate keeps the trees perpetually a little short of water.

"We see these rings in the grain of wood, usually badly distorted from the way the wood is cut," said Prof. Douglas the other day. "They show better in the end of a large beam and best on top of a smooth stump. Each year a complete layer or annual ring of wood is laid on, all about the trunk and branches of a growing tree, just under the bark. The late summer or autumn growth is darker in color and forms a distinguishing feature of each ring. If years were all alike, the rings would usually be all alike in thickness, but in actual fact years differ greatly in the amount of rainfall and other climatic conditions, and occasionally fires and pests injure the tree, or a falling tree nearby lets in more sunlight and so helps it."

"It is evident (*Turn to next page*)

Calendar's Missing Link—Continued



RINGS IN YELLOW PINE. The ones closely packed together show the drought that occurred in Arizona in the years 1571-1593.

that we must be able to distinguish such local effects as those just mentioned, from the more valuable climatic history in trees. This again is easily done by comparing a number of trees together. If, for example, we count back from the bark in ten trees and in nine (or even in all ten) we find a small ring at, say, five years: that means a drought five years ago and is a definite climatic effect. But if we find a certain ring small in only one of the ten, it is a local effect in that tree and not climatic.

"Aided by the generosity of the University of Arizona and the Carnegie Institution of Washington last year, I studied climatic effects in pine trees over a large western area extending from the eastern slope of the Rocky Mountains to the Pacific Coast and lying between the Columbia River on the north and the Mexican border on the south. Without going into the many interesting details it was found that the three main divisions of this great area, namely, the Sierra Nevada Mountains, the Northern Arizona Plateau and the Pikes Peak region, while differing slightly in special points, all showed the same cycles. These proved to be very nearly simple fractions of 34 years, an interval which has long been known as three times the 11-year sunspot cycle. It is called the Brücknor cycle after its discoverer. This result of the western cycles depends upon more than 50,000 measures of tree rings and long, well-checked analyses by an instrument called the cyclograph, designed and constructed for the purpose.

"This not only was evidence found for climatic cycles, but these cycles showed relation to well-known solar changes. This fact was very interesting to me because this study was started years ago from a conviction that solar variations are reflected in the weather, and by weather into tree growth.

"So this study of climatic cycles became a study of climatic history found in trees. Of course, the

longer we can make this history the better tests we can make of any theory of climate. Hence the great Sequoias of the Sierra Nevada Mountains in California have become very valuable for this purpose.

"One must distinguish between the Coast Redwood—*Sequoia sempervirens*—and the giant or Mountain redwood—*Sequoia gigantea*—a different species of the same genus. The former coast tree is the one that visitors more often see because it is on or near the main lines of travel but, though very wonderful, it is not quite so big nor so old nor so beautiful in appearance as its cousin up in the higher altitudes where the snows of winter get too deep for travel. But more important for us is the difference in their climatic records. In all study so far the coast tree has failed to show like rings in like years, and so it has not yet been possible to use it in climatic study because its variations represent local conditions. But in the Giant Sequoia the drought years are identical in all the groves through two and even three thousand years. Consequently this sequoia is one of the best, most accurately dated and oldest recorders of climate.

"Fifteen years ago Dr. Ellsworth Huntington of Yale University discovered three trees (that is, stumps) showing over three thousand rings. In 1915 and 1916 I secured radial cuttings from these same stumps, suitable for laboratory study and determined their exact age. And during the past summer while dating a new group from the Soringville groves, south of Sequoia National Park, I found a fourth three-thousand-year tree. Of these four the oldest is 3233 years.

"I have in my laboratory 49 radial samples of these big trees, most of them about 2000 years in age. Their rings have not yet reached the stage of final test for climatic cycles, but they will, I am sure, prove to be superb material on account of their long and sensitive records. But since they have fairly abundant precipitation, their complete interpretation in

terms of known climatic factors will be more complex than in the case of the Arizona pines. Naturally, long records of Arizona pine are most desirable, for this tree in that relatively dry climate, gives a very clear record of rainfall and drought.

"The last great drought was from 1899 to 1904. During that time Mormon Lake, the largest natural body of water in Arizona, 4 x 6 miles across, went entirely dry. Hundreds of homesteads and farms were abandoned. Now they have all been taken up again and are producing large crops. The trees show that drought very vividly by a group of very small rings often so small that the separate ones cannot be distinguished, even with a powerful magnifying glass. The trees show also a drought in 1820 and 1748 and perhaps a dozen others which have come down to us in history. The major droughts in the trees seem to have occurred at intervals of about 150 years, the earliest one showing near 1300 A. D.

"At this point the archaeologists enter the game. Dr. Clark Wissler of the American Museum of Natural History in New York was the first to suggest the use of rings in prehistoric beams in the ancient ruins of the southwestern area. At his suggestion Mr. Earl H. Morris supplied a beautiful collection beam from Aztec, New Mexico. Then the National Geographic Society began the splendid help which they have given this study. Mr. Neil M. Judd in charge of their expedition at Pueblo Bonito, New Mexico, began his fundamental collection, on which an extended prehistoric chronology is being based.

"Dr. J. A. Jeancon, then of Denver, and Mr. Ricketson conducted the first Beam Expedition of the National Geographic Society and collected a hundred valuable specimens in the area between the Little Colorado and the Rio Grande Rivers. Dr. A. V. Kidder of Andover, Mass., sent a fine collection from Pecos, New Mexico. Dr. Cummings and Mr. Hargrave of the University of Arizona made most important contributions.

"This large collection of over 1200 specimens was studied in the following manner:

"After smoothing the surface of the specimens and even shaving a part of each with a sharp razor, the wood was touched with kerosene. This brings out (Turn to page 329)

Most Eclipse Parties Successful

Astronomy

Seven times has Prof. John A. Miller, Swarthmore College astronomer, traveled from his home to Connecticut, to Mexico, to Sumatra, and to other parts of the world to observe an eclipse of the sun. And seven times has he seen the dark disc of the moon creep across the sun, then the corona suddenly flash out for a few minutes, only to disappear just as suddenly, with the sun reappearing. The last one he saw was on May 9, thus making him undisputed champion. No other astronomer has seen as many, though one has been to nine and another to eight.

Prof. H. D. Curtis, of the Allegheny Observatory of Pittsburgh, who accompanied Prof. Miller on his recent trip to Sumatra, as he has on previous expeditions, has been to the most, for the last was his ninth. But three times he has had cloudy weather and was unable to make any observations.

The president of the University of California, Dr. W. W. Campbell, has been to eight eclipse tracks. However, on two occasions he has had clouds make his trips in vain. Thus he has seen six, like Dr. Curtis.

Prof. S. A. Mitchell, of the University of Virginia, has been to seven. But on his last expedition, to Norway in 1927, he had cloudy weather, so that he has also seen six.

One Government astronomer, Prof.

G. H. Peters, has been to six, none of which have been completely clouded, though some have been clearer than others.

Prof. Miller's good fortune in Sumatra may result in providing one of the two checks of the Einstein theory of relativity at the May, 1929, eclipse. At least five expeditions, German, British, French and American, planned to make such observations to see whether the position of the stars in the sky is affected by the proximity of the sun. Einstein says that they would be affected, and has the measurements of two previous eclipses on his side.

Apparently the only two of the expeditions that essayed this experiment that had clear weather were those of Prof. Miller and of Dr. Walter Baade from Hamburg, Germany, in Cebu, one of the Philippine Islands. At Alor Star, in Kedah, and Pattani, in Sumatra, where two British expeditions were located, clouds seriously hampered the observations.

Prof. Miller's success, with the eclipse occurring right in the center of a perfectly clear spot, is especially fortunate, because of his cooperation with the Naval Observatory party at Iloilo, in the Philippines, which was also successful. At both places identical cameras 62 feet long, giving an

image of the sun $\frac{7}{8}$ inches in diameter were used. The same kind of plates, and exposures of the same duration were made at both places. This was the first time that such an experiment had been tried, and as the eclipse occurred at Iloilo about an hour later than Sumatra, the two sets of plates should show how rapidly the corona moves.

The rest of the Naval Observatory party's photographs were quite successful, despite thin cirrus clouds, it was found after the plates had been developed. Dr. R. L. Waterfield, who was located nearby, was not so fortunate. After developing his plates he found that the clouds had greatly impaired them.

Undoubtedly important results concerning the Einstein theory, as well as other scientific ideas, will come from these eclipse plates, but not before many months. Not until they return to the safety of their observatories will the astronomers begin their exhaustive examination and measurement. And then these measurements will be the basis of long and laborious calculations. So the attendance at an eclipse is but the beginning of work for an astronomer, and those who had cloudy weather at least have the satisfaction of knowing that they are saved much labor!

Science News-Letter, May 25, 1929

Poison Ivy Yields Easily

Medicine

Green leaves are on the poison ivy again, and at least some outings are bound to have unhappy after-effects. Chemists and botanists, however, unite in declaring that there is no longer any need for susceptible individuals to suffer hours of itching agony from a luckless contact with the evil weed. There are several very simple remedies, made of common, non-proprietary chemicals, that will banish ivy poisoning in almost 100 per cent. of all cases.

A preventive recommended by Dr. James B. McNair of the Field Museum of Natural History, Chicago, is a five per cent. solution of ferric chloride in water, or in a mixture of water, alcohol and glycerin. This is to be washed on all exposed skin surfaces before going into the woods, and allowed to dry without wiping. The thin deposit of iron salt neutralizes the ivy poison immediately upon

contact. This remedy has been in use by the botany classes of the University of Chicago for several years, with very good results.

For persons who have had the ill luck to become poisoned, Dr. James F. Couch, of the U. S. Department of Agriculture, recommends a wash of a five per cent. solution of potassium permanganate. This oxidizes the poison, and healing follows rapidly. This remedy leaves the skin brown, but the stain may be removed with a one per cent. solution of oxalic acid. Any of these remedies can be mixed by any druggist, without a prescription.

Poison ivy is really a misnomer, for the plant is not related to the common ivy. It is a sumac, and closely related to the even more vicious poison sumac that grows in our bogs. Poison ivy can be recognized easily by the three-parted leaves,

which have given rise to the old saying: "Leaves three, let it be!" The plant may either climb trees by means of aerial roots that cling to the bark, or it may creep along just under the surface of the soil, sending up thickets of short, woody shrubs from a foot to three or four feet high. In this latter form the plant is sometimes called "poison oak", but that name is incorrect; it belongs by rights to a related shrub of the Pacific Coast.

Poison sumac troubles fewer persons than poison ivy, but those who are susceptible get hit harder. It is perhaps providential that this shrub grows only in acid-water bogs or on their borders. It looks very much like ordinary sumac, but can be distinguished by its pale gray bark and its drooping clusters of white berries.

Science News-Letter, May 25, 1929

The Evolution of the Dollar Mark

Mathematics

FLORIAN CAJORI in *A History of Mathematical Notation* (Open Court):

The history of the dollar mark is difficult to trace. The vast majority of old documents give monetary names written out in full. This is the case also in printed books. Of nine Spanish commercial arithmetics of the seventeenth and eighteenth centuries, five gave no abbreviations whatever for the *peso* (also called *piastre*, *peso de 8 reales*, "piece of eight," "Spanish dollar"). In fact, some did not mention the peso at all. The reason for the omission of *peso* is that the part of Spain called Castile had monetary units called *reales*, *ducatos*, *maravedises*, etc.; the word *peso* was used mainly in Spanish America and those towns of Spain that were in closest touch with the Spanish colonies. After the conquest of Mexico and Peru, early in the sixteenth century, Spanish-American mints, established in the various points in the Spanish possessions, poured forth the Spanish dollar in such profusion that it became a universal coin, reaching before the close of the century even the Philippines and China. In the seventeenth century the Spanish "piece of eight" was known in Virginia, and much was done to promote the influx of Spanish money into that colony. The United States dollar, adopted in 1785, was avowedly modeled on the average weight of the Spanish-dollar coins in circulation. Thomas Jefferson speaks of the dollar as "a known coin, and most familiar of all to the minds of the people." No United States dollars were actually coined before the year 1794. We proceed to unfold our data and to show the evolution of the dollar mark by stages so easy and natural that the conclusion is irresistible. There are no important "missing links." To enable the critical reader to verify our data, we give the sources of our evidence. No man's *ipse dixit* is a law in the world of scientific research.

We begin with information extracted from early Spanish printed books, consisting of abbreviations used for *peso* or *pesos*.

Ivan Vasquez de Serna.....	1620
Pes., pes de 8 rela.	
Francisco Cassany.....	1763
p., also ps.	
Benito Bails.....	1790
pe, seldom p.	
Manuel Antonio Valdes.....	1808
ps.	

Here we have the printed abbreviations *Pes.*, *ps*, *pe*, *p*. More interesting and convincing are the abbreviations found in manuscripts which record commercial transactions. We can give only a small part of the number actually seen. In our selection we are not discriminating against symbols which might suggest a conclusion different from our own. As a matter of fact, such discrimination would be difficult to make, for the reason that all the abbreviations for the *peso*, or "piece of eight," or *piastre* that we have examined point unmistakably to only one conclusion. We say this after having seen many hundreds of these symbols in manuscripts, antedating 1800, and written in Mexico, the Philippines, San Felipe de Puerto, New Orleans, and the colonies of the United States. It was a remarkable coincidence that all times the contraction of the word dollar was best known, namely, the *peso*, *piastre*, and "piece of eight," began with the letter *p* and all three were pluralized by the use of the letter *s*. Hence *p* and *ps* admirably answered as abbreviations of any of these names. The symbols in Figure III show that the usual abbreviations was *ps* or *p*, the letter *p* taking sometimes a florescent form and the *s* in *ps* being as a rule raised above the *p*. The *p* and the *s* are often connected, showing that they were written in these instances by one uninterrupted motion of the pen. . . . The capital *P* is a rare occurrence. We have seen it used at the beginning of sentences and a few times written in ledgers at the top of columns of figures. In the sixteenth century the *ps* had above it a mark indicating the omission of part of the word. Sometimes the contraction of the *pesos* was *pss.* or *pos.* Not infrequently two or more different abbreviations are found in one and the same manuscript. The body of the text may contain the word written out in full, or contracted to *pss* or *pos*, while the margin or the head of a column of figures may exhibit *ps* or simply *p*. These were the abbreviations used by the Spanish-Americans from the sixteenth century down to about 1820 or 1830. The transition from the *ps* to our modern dollar mark was not made by the Spaniards; it was made by the English-speaking people who came in contact with the Spaniards. At the time when Mexico achieved its independence (1821), the

\$ was not yet in vogue there. In a Mexican book of 1834 on statistics both the *ps* and the \$ are used. . . .

Mr. Augustus H. Fiske, of Cambridge, Massachusetts, has pointed out to the present writer that the modern dollar mark occurs in a diary of Ezra L'Hommedieu for the year 1776. L'Hommedieu was a native of Southold, Long Island, and a Yale graduate. He was a member of the New York Provincial Assembly, which, on July 10, 1776, styled itself the Convention of the Representatives of the State of New York. The first date in the diary is June 10, 1776; the last is December 5, 1776. Before August 21, 1776, most sums of money are expressed in pounds and shillings. When dollars are mentioned, the word "dollar" is written out in full. On August 21 occurs the first dollar symbol. Under date of August 28 the treasurer is to advance \$10 for removing military stores from New York. On October 2 a loan of \$100,000 is obtained from the Continental Congress, on October 3 and 4 the same sum is referred to in a similar way. On October 4 the treasurer is to pay \$6412 2-3 bounty money to the rangers. The \$ signs now appear more frequently. . . . We see in this diary the gradual substitution of the conventional sign \$ for the spelled word. . . .

The origin of the dollar mark is simplicity itself. It is an evolution from *ps*. When the *p* was made by one long stroke only, then the mark took the form \$, as used by Robert Morris. Before 1800 the regular mark \$ was seldom used. In all our researches we have encountered it in eighteenth-century manuscripts not more than thirty or forty times. None of these antedates L'Hommedieu's diary of 1776. But the dollar money was then very familiar. In 1778 theater prices in printed advertisements in Philadelphia ran, "Box, one dollar." An original manuscript document of 1780 gives thirty-four signatures of subscribers, headed by the signature of George Washington. The subscribers agree to pay the sum annexed to their respective names, "in the promotion of support of a dancing assembly to be held in Morristown this present winter. The sums are given in dollars, but not one of the signers used the \$ symbol; they wrote "Dollars," or "Doll," or "D."

Alcoholic Insanity on Increase

Psychiatry

Since prohibition there has been a continuous increase in the number of patients, insane from excessive use of alcohol, admitted for the first time to hospitals in New York State, Dr. William C. Garvin, medical superintendent of the Binghamton, N. Y., State Hospital, declared before the American Psychiatric Association. The lowest admission rate occurred in the year ending June 30, 1920, the year prohibition went into effect. The peak was reached in 1927.

Dr. Garvin also stated that the patients entering recently have been more acutely ill than were those coming to the hospital before prohibition. He said that patients, owing to the character and quantity of the liquor imbibed, appear more poisoned, there is a greater degree of prostration.

tion than formerly, confusion of the mind is more often present, and patients are more often delirious. Recovery is slower, but is also more complete.

"I am of the opinion," said Dr. Garvin, "that the changes are due to the fact that there is not so much continuous and excessive drinking among alcoholics as formerly, as it is too costly; moreover, the quality has deteriorated and is more poisonous in character. The chronic alcoholic does not drink beer any more, as this fails to have the requisite 'kick.' He drinks what he has the funds to purchase and this is chiefly the cheap so-called whiskey and gin."

"Government analyses show that the most of the hard liquors furnished by the bootleggers are obtained

from re-distilling methyl spirits, and that it is practically impossible for the ordinary bootleggers who distill to remove all the noxious ingredients.

"A surprising number of recoveries take place despite the quality of the liquor drunk. This is probably due to the fact that they are not able to drink liquor continuously as chronic alcoholics did in former days, and therefore, they are not so chronically poisoned."

Dr. Garvin expressed the belief that prohibition will never abolish the liquor traffic. He said:

"As a people, we are inclined to emotional crises, sentimentality, and to believe that the passage of a law is all that is necessary to remedy conditions and (*Turn to next page*)

Temperament of T. B. Patients Change

Hygiene

Tuberculosis patients are inclined to prefer solitary amusements and pursuits, particularly in early stages of the disease. Those who have become bed-ridden are more generally eager for social contacts. This new angle on the mental tendencies that link with physical disease was presented before the American Psychiatric Association by Dr. Clarence A. Neymann, of Chicago.

It has been a general presumption among physicians that patients suffering from pulmonary tuberculosis in its various manifestations were happy, cheerful, and if anything rather elated individuals, the psychiatrist said. This would place them in the personality class known to psychiatrists as ex-

trovert or social-minded. Dr. Neymann gave 300 tuberculosis patients in a sanitarium a test, including such questions as: Do you like excitement, like to be alone a great deal, enjoy social gatherings just to be with people, like to do the things you dream about? The test showed that 46 per cent. of the patients were introverts; that is, they preferred being alone and were more absorbed in themselves than in the world about them. Thirty-nine per cent. were classified as extroverts, the remainder were in the neutral class, in which social and solitary traits are fairly balanced.

Science News-Letter, May 25, 1929

Glands vs. Behavior

Psychiatry

The troublesome child, who makes life miserable for his family, his school teacher, the dog, and the neighbors, may be the unfortunate victim of a disordered gland system. This new explanation to account for the behavior of problem children was presented before the American Psychiatric Association at Atlanta by Dr. Louis A. Lurie, of Cincinnati. Out of five hundred cases of children with behavior disorders, fifty were found to be due to endocrine gland disturbances. The percentage is sufficiently large, he pointed out, to make it clear that every child with behavior disorder should have his

endocrine glandular system examined before he is pronounced a delinquent who is likely to come to no good end.

A report on the careers of one hundred fifty children who have had sleeping sickness in the past ten years and have changed from normal children into youthful offenders against society was made by Dr. Charles E. Gibbs, of Kings Park, New York. These survivors of sleeping sickness who have the compulsion to run wild, steal, lie, fight, or destroy following a stormy and prolonged course of mental disorder, the duration of which is not yet known, the psychiatrist said. *Science News-Letter, May 25, 1929*

City Children Lose Idealism

Hygiene

Children of the present day who live in crowded conditions in the cities are losing a good many traits that make for happiness and strength of character, according to observations of Dr. J. S. Plant, director of the Essex County Juvenile Clinic, in New Jersey. Speaking before specialists in mental and nervous diseases, attending the American Psychiatric Association, Dr. Plant said that children who live in apartments and other crowded quarters are so closely tied to people that they cannot escape their foibles. Hence it is difficult for the coming generation to build up any hero idealism or parent idealism.

"We find very few children in these crowded families who are planning to follow their father's footsteps. This is usually ascribed to their desire to better themselves, but we wonder whether there is not this factor of having lived so closely to the father that it is difficult to identify with any satisfaction."

Crowded conditions are also stunting the child's development as a self-contained, self-sufficient individual, the psychiatrist has found.

"Where the youngster lives in rooms and neighborhoods so crowded that he is rarely alone, he does not easily develop an attitude of looking to himself for the real satisfaction of life," he said. "One sees this preserved in adult persons who seem almost afraid to be alone."

The mental strain of constantly having to "get (*Turn to next page*)

Alcoholic Insanity—Continued

to bring about human betterment. More drastic laws have recently been promulgated in order to punish more effectively violators of the national enactments. Whether they will prove successful remains to be seen, but it is highly probable that those individuals who have been accustomed to drink and have the price to purchase it, will, for the most part, continue to do so. When the profit is sufficiently attractive the illegal seller of illicit liquor will take a chance, and the purchaser will salve his conscience, if he has any scruples, by various methods of rationalization familiar to all."

Dr. Garvin mentioned that the patients first entering the State Hospitals with alcoholic psychoses come principally from the city, and there

Lose Idealism—Continued

"along" with other people is telling on the children of these families, Dr. Plant also pointed out. Adults often feel the strain of having to adjust themselves to others if they are persistently in a group for a period of time, and in present city living conditions there are children who have never known any other situation.

Science News-Letter, May 25, 1929

Brain Disorders Probed

Psychiatry

Fundamental progress in understanding certain abnormal brain conditions, the first step toward their prevention, was reported at the meeting of the American Psychiatric Association in Atlanta, by Dr. Temple Fay and Dr. N. W. Winkleman, of Philadelphia, as a result of investigations at the new institution known as the D. J. McCarthy Foundation for Study and Prevention of Nervous Diseases. This foundation has been working for two years on problems of epilepsy and mental deficiency. It has been found that in certain mental cases there is pressure on the brain due to excessive accumulation of the cerebro-spinal fluid. The pressure causes the brain to atrophy. Tracing back the vicious chain of consequences, the investigators have found evidence that the root of the trouble may lie in the impairment of obscure structures in the brain, known as Pachionian bodies. Further researches are in progress, it was stated.

Science News-Letter, May 25, 1929

The government of Australia has bought ten grams of radium, at \$500,000.

are a greater number of foreign born than native whites. The rate is relatively higher among Negroes than native whites.

The two races in which alcoholic psychoses are most prevalent are the Irish and the Slavonic, Dr. Garvin said. Of a total of 4,544 alcoholic patients admitted during the last ten years, 1,692 were Irish and 491 Slavonic. On the other hand, the number of Hebrews suffering from alcoholic psychoses is surprisingly small, totalling only 44 for the ten years.

Alcoholic insanity, as a rule, occurs principally in middle age following years of intemperate use of alcohol, but the acute phase generally develops in connection with recent excesses. *Science News-Letter, May 25, 1929*

Unhappy Marriages

Psychiatry

The greatest single cause of unhappy marriage today is emotional immaturity, Dr. George Pratt, of New York, declared in a paper read before the American Psychiatric Association in Atlanta. This same emotional immaturity causes friction in the homes of taxi drivers and judges, shop girls and society matrons. It has such well-known symptoms as selfishness, intolerance, and uncontrolled impulsiveness.

"Psychiatrists are not yet ready to say that before a marriage license is granted a couple should take an examination to show whether they are mentally and nervously fit," Dr. Pratt said. "That may come a century from now. But we are ready to point out that marital friction has symptoms that the psychiatrist can often nip in the bud."

The psychiatrist can often show a husband and wife how to reconcile clashing wills or how to direct a desire for power into safer and more useful channels, he continued. Intelligence has comparatively little to do with these emotional adjustments. They are the result of home and school training, and one of the great needs of today is more parents and teachers who are emotionally mature.

Science News-Letter, May 25, 1929

Forest Service records show that some trees have been struck by lightning as many as seven or eight times.

A new electric machine that reknits runs in silk stockings can repair a run the entire length of a stocking in about two minutes.

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Static Comes Long Distance

Radio

When your enjoyment of a radio program is interfered with by crashes of static, you may be listening to the broadcasting from a storm area in Africa. Static is not a local disturbance, but may travel a large part of the distance around the world, A. E. Harper, of the department of development and research of the American Telephone and Telegraph Company, told the Institute of Radio Engineers.

Mr. Harper has been in charge of researches in the direction of static made at Houlton, Maine, in connection with the trans-Atlantic telephone service. Telephony from Europe is received at Houlton, and carried over telephone lines to all parts of the United States.

"It is sometimes assumed that static is of relatively local origin and is rapidly attenuated along its path," said Mr. Harper. "This theory seemed to us rather untenable, since simultaneous records have been made of static crashes at Hawaii, New York, and Germany."

"We believe that for receiving in Maine the most important source of static is thunderstorms in the United States and Canada, after which we put thunderstorms in other portions of the globe. In addition to actual thunderstorms we find static accompanying weather disturbances such as electrified clouds, etc., which have not reached the point of producing audible thunder."

"As a working hypothesis it may be assumed that such static is produced on the southeast edge of an advancing low-pressure area, especially if precipitation occurs. This condition when accompanied by up-rushing winds, according to Dr. W. J. Humphreys of the U. S. Weather Bureau, tends to produce a thunderstorm. Therefore in the absence of other data, thunderstorm charts would be the most logical index of the location of static sources. This theory seems to be strengthened by our Houlton measurements."

The instrument for measuring static consists of two loop aerials, connected to radio sets of the same power. The two loops are at right angles, so that one picks up the static from east or west and the other from north or south. These two sets are connected with a cathode ray oscillograph tube so that every crash of static appears as a bright green line on a dark screen. The length of the

line depends on the intensity of the static, and its direction on the actual direction of the disturbance.

Three times a day a five-minute run was made, with one man watching the screen and another recording the data. From these records Mr. Harper has found that places as remote from Maine as Florida, Africa, a position at sea off Argentine, southern Mexico, Ecuador and Brazil are all responsible for some of the static that interferes with the telephone service. All these are recognized as great thunderstorm centers.

Troublesome as static is to the radio listener, it may be of use in predicting weather by giving warnings of approaching storms, S. W. Dean, of the Department of Development and Research of the American Telephone and Telegraph Company, told the engineers.

Experiments which they made at Houlton show that a storm could be located several days before it arrived.

Mr. Dean told of the case of a storm which first gave evidence of its existence on September 7, 1928, when it was somewhere northwest of the Great Lakes, at a bearing of 320 degrees from Houlton. Each day thereafter they broadcast its progress in the form of static. Every time measurements were made at Houlton, this center of static was indicated in the direction of the storm. On September 13, it passed in the vicinity of Houlton and was accompanied by unusually frequent lightning. On that day the observation showed static from all directions as if the storm completely surrounded the town. The next day, the disturbance went out to sea to the southeast and evidence of the storm at sea persisted for several days afterwards.

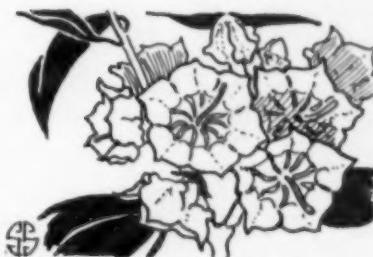
Though these experiments only located the storm along a line a certain direction from Houlton, observations from two distant points would have permitted an exact location of it where the line crossed.

"It has been possible to correlate the observations with weather conditions in the vast majority of cases, excepting, of course, those occasions, when the sources of atmospherics were in regions not covered by available weather data," said Mr. Dean. "In many cases the directions from which atmospherics came coincided with the bearings from Houlton of places where thunderstorms were reported. In (Turn to next page)

NATURE RAMBLINGS

By FRANK THONE

Natural History



Mountain Laurel

When a botanist wants to pay a high compliment to a friend, he names a plant after him. Naturally, the more beautiful the flower the higher the compliment. Peter Kalm, contemporary and co-worker of the great Linnaeus, has received perhaps the most flowery botanical compliment that has even fallen to the lot of a scholarly collector of plants, for Linnaeus gave to one of the handsome shrubs his friend sent back from America the name of *Kalmia*.

Kalmia, or mountain laurel, is a most attractive plant at any time, for its dark shining leaves are evergreen, relieving even the white bareness of the winter woods. But when spring brings it leave to bloom, the laurel simply outdoes itself. Its clusters of closed star-flowers, pink but by sheer miracle of vegetative good taste not too pink, are things for poets to write sonnets about. Only the newer generation of poets, who affect to be realistic and hard-boiled, do not write verses about flowers any more, which is a great pity.

Most of our fine flowers are in greatest danger from vandalistic gatherers when they are in bloom, which is what one might expect. But the mountain laurel is less troubled than it is in late autumn and early winter. Its evergreen leaves have found altogether too good a market in Eastern cities, and the more accessible areas where it grows are rapidly being depleted by the market-hunters. Fortunately for future generations of American flower-lovers, mountain laurel is true to its name and the higher slopes of the Appalachians still give it refuge. And since two large portions of this chain are being established as U. S. National Parks, at least some laurel will survive to gladden the eyes of our great-grandchildren and to keep green the memory of Linnaeus' friend, Peter Kalm.

Traffic Problems in France

Engineering

EARNEST ELMO CALKINS in *If Big Business Came to France* (Atlantic Monthly, April, 1929):

In the course of a recent vacation in France I amused myself by imagining the effect on that country and its people of the introduction of our big business methods: huge manufacturing plants making goods distributed by advertisement to every town, village, and hamlet; the pleasant land of France mapped out in red-headed tacks on the glass-topped desks of sales managers; salesmen primed with sales psychology from instruction books; brief cases stuffed with portfolios of advertising campaigns; sales conventions, drives, "Eat - more - tripe-à-la-mode-de-Caen weeks," chain stores, the Rotary Club holding its weekly luncheon at the Grand Hôtel de l'Europe et de l'Epée; the sky line of Paris broken by steel-skeletoned skyscrapers dwarfing the towers of Notre Dame; the picturesque individuality of the *rues nationales* punctuated by the standardized store fronts of chain stores, and everywhere houses built of the same materials on the same plan, filled with the same furniture and inhabited by people wearing the same clothes. France would lose her great national industry, tourism, but worse, she would lose her point of view, her philosophy, her individualism; and that would be a catastrophe. The world would be poorer with France other than she is.

The open road is not a bad place from which to study a people. One soon gets away from the sophisticated spots where contact with outsiders has blurred individuality and produced a sort of hybrid civilization which, like all hybrids, retains the worst features of each. The motor car gives us a cross section; cities, villages, open country; farms, olive orchards, vineyards; mountain, seacoast, river; and the changeful life that is lived in all of them. I have the deaf man's facility in using his eyes, and my conclusions are based on observation, on what I see as I go about. All I have to contribute to an important controversy are the habits and character of the French people as seen by a man who has few means of contact, but who long ago learned that what people are speaks louder than what they say.

In cities the problem of motor-congested streets affords us an index to national temperaments, for we

Americans too have a traffic problem. Compare the three great capital cities, New York, London, and Paris.

The New York traffic cop is an autocrat. He likes to disregard the red and green signals to show you, as Don Marquis says, "who is king." The supreme sin of the motorist, in his eyes, is *lèse-majesté*. And he is often quite violent about it.

The London bobby is an opportunist. His only concern is clearing the traffic. He winks at violations of the rules if they are intelligent and successful. He is less assertive, and yet obeyed more implicitly, than his New York counterpart. But he is dealing with a more law-abiding populace.

The Paris *gendarme* is not concerned with the motor traffic at all. His care is the pedestrian. At regular intervals he cleaves a swath through the moving stream of vehicles, like Moses dividing the Red Sea, and the swarms of *piétons* cross over. Then he waves his white baton and the cars resume their struggle for gangway without interference from him. And yet it is easier to go about in a car in Paris than in London or New York. In the country there is no speed limit, but drivers are held strictly accountable—a more intelligent regulation than our own.

Another comparison shows the different applications of a similar idea.

Feverish activity on the New York Stock Exchange recently caused the market to outstrip the ticker, and our inventive ingenuity is being directed toward producing a recording device to register sales and quote prices as fast as they are made.

In France they are installing at race courses near Paris a calculating machine which will work out the odds on the *pari mutuel* system in less time than the old hand-and-head method. In one country a machine to measure business; in the other a machine to measure pleasure.

In France one is never at a loss to identify a road. The companionable white kilometre stones accompany one everywhere, recording on the hither side the next two communes and their distances, on the front the number and class of the road, tying up perfectly with the map. The name of each village is displayed in its civic centre, white letters on a blue plaque—a device so obviously useful one wonders why it has not obtained here. Have you never tried in vain to learn the name of the town you were passing through? Nor is all this a development of motoring; it preceded the gasoline era by many years. For the French realize that roads are civilizers. The motorist merely inherits them, but they make France a motorist's paradise.

Science News-Letter, May 25, 1929

Static and Storms—Continued

many others the sources of atmospherics were apparently low-pressure areas where thunderstorms may have occurred, though none was observed at Weather Bureau stations. We are inclined to believe from these results as well as from the work of others, that most atmospherics are due to lightning discharges, although, of course, the evidence is too incomplete to permit us to draw positive conclusions.

"A low-pressure area seems to produce more atmospherics when it is moving rapidly. When it is more or less stationary and quiescent it produces few atmospherics. In the summer, lows produce many more atmospherics when over land than after they pass out to sea, but in cool weather the reverse is sometimes true. In the winter, sources as far away as Texas, the West Indies, South America, and Africa can be observed, but in the summer the effects of nearby disturbances usually overshadow these

distant sources. On days when there is nearly a complete absence of thunderstorms in the United States, the atmospherics are generally light, unless there is a source due to a low not far out in the Atlantic."

Mr. Dean suggested that this method could be used to a special advantage in tracing storms out at sea or in regions where there are no weather stations.

"It would seem that as few as three stations, one on the north Atlantic coast, one on the south Atlantic coast, and one in the middle west, would cover the eastern part of North America and the western part of the Atlantic Ocean fairly well," he said. "Our experience indicates that such a system might be helpful in the location of storms in northern Canada, the Atlantic, the Gulf of Mexico, and the West Indies, as well as those in the eastern half of the United States."

Science News-Letter, May 25, 1929

Horizontal Rainbows Due to Droplets

Meteorology

Rainbows in the sky are familiar to everybody, but if you are fortunate enough, you may some time be able to see a horizontal rainbow on a calm surface of water. You are most likely to see it following a fog, and if you are particularly fortunate, you may even see a cluster of several horizontal rainbows.

In the *Journal of the Franklin Institute*, Dr. W. J. Humphreys, professor of meteorological physics at the U. S. Weather Bureau, describes the formation of these strange phenomena, and tells of two people who have seen them in clusters. The bow seems to be right on the surface of the water, and in the case of the cluster, one appears right behind another.

The cause, says Dr. Humphreys, is a layer of tiny droplets of water, resting on the surface of the body of water, but prevented from merging into it by a thin film of oil on

the surface. The sun is in back of the observer, and the rays of light are refracted back to the eye by the tiny droplets of water on the surface, just as they are by the drops of water in the sky in the case of the usual rainbow. If the sun is overhead, the horizontal bow appears as a circle. If lower, it is an ellipse, surrounding the observer. If at an angle of 42 degrees above the horizon, it is a parabola, while at a lower angle of the sun it is a hyperbola. All of these curves are what the mathematician calls "conic sections," that is, the curves formed by the intersection of a plane with a cone.

The cluster of several bows is formed by reflections from the actual surface of the water, as the sheet of droplets may not be quite in contact with the water surface.

Science News-Letter, May 25, 1929

Student Experiments With Space

Psychology

Alice in Wonderland fell into a topsy-turvy world, but the world that Miss Jane Goldschmidt, of New York, a senior specializing in psychology at Smith College, has recently discovered with the aid of a pair of prism glasses, is almost as bewildering.

How would you like to reach for a glass of water and meet only empty space—to think straight doors were curved—or to see rainbows around the heads of all your friends? This is what happened to Miss Goldschmidt when she set out to investigate the habit of space perception.

Psychologists say that the ability to tell what objects are far away and what objects are nearby is a habit which must be acquired. In infancy the world seems only a confusing blur of color and line. Gradually, however, by reaching for things and in other ways, we learn to see the world in three dimensions, and thus form the habit of space perception.

Miss Goldschmidt decided to investigate the habit further. For three days she wore a pair of prism glasses which moved everything she saw to the left. Straight lines became curved, and everywhere light was bent or refracted as it passed through the prisms into rainbow bands of color. To this new situation, Miss Goldschmidt's old habits of space perception were poorly adapted. She reached for a pencil and felt only

her desk. She walked towards a door and struck the wall. Soon, however, she began to form new habits, and could reach for things with hope of success. To learn to walk downstairs took longest of all, but in three days she was completely adjusted to her new world.

When she took off the glasses she had the same difficulties as when she had put them on. All the curves, errors, and bands of color were still present, but reversed. It took her a day and a half to feel at home again.

One of the most interesting results came when she touched a straight surface which, through the glasses, appeared curved. It felt curved as well. This seems to indicate the primacy of sight over touch—a point which has long been debated among psychologists.

This is the first time that the prism glasses experiment has been tried continuously, and Miss Goldschmidt's findings will soon be published. She intends to continue the study of psychology next year at Columbia University.

Science News-Letter, May 25, 1929

The recent finding of a skull and more than 10 bones of an armored dinosaur was the first discovery of this prehistoric monster within the United States.

Vaccine Fails in Cattle

Medicine

Unfavorable results were reported from one of the latest experiments made in this country with the Calmette vaccine against tuberculosis. This protective vaccine, developed by the French scientist, A. Calmette of the Pasteur Institute, has been the subject of heated controversy among scientists in this country and abroad. It was concluded from this latest experiment that the Calmette vaccine does not protect cattle which have been intimately exposed to tuberculous animals, reported the investigators, Dr. W. P. Larson of the University of Minnesota, S. J. Stanard, Commissioner of Agriculture, and W. A. Evans, at the meeting of the American Association of Immunologists.

Science News-Letter, May 25, 1929

Tree Rings—Continued

the rings in a remarkable manner. Various specimens were compared together ring by ring till identity was found in the distribution of large and small rings. This gave a continuous sequence of about one hundred rings.

"Other specimens were then compared, trees cut a little later or a little earlier; a part of each would tie in to the hundred rings already known and the remainder would extend the known sequence a little forward or backward as the case might be. In this way, little by little, the prehistoric sequence was extended until now it is 586 years long. In a similar way recent collections from inhabited villages of the Hopi Indians have extended our modern dated rings a century and one half back to the year 1260 A. D.

"Thus, at the present stage of this study, we have 670 years covered by modern rings accurately dated and 586 years represented by rings in the prehistoric sequence. Between these two series is a gap, probably not large, perhaps under 200 years, whose exact duration must be determined by specimens yet to be found. When this gap is filled, not only will we have a superb climatic and solar history of 1254 years, plus the extent of the gap, but also we shall secure a most interesting bit of human history from the rings of trees, for we shall then have the exact dates of buildings of thirty or more of those splendid prehistoric ruins already famous in Southwestern archaeology, and we may have a new clue to the prediction of floods and droughts."

Science News-Letter, May 25, 1929

Our Porous Matter

Physics

A. S. EDDINGTON, in *The Nature of the Physical World* (Macmillan):

Between 1905 and 1908 Einstein and Minkowski introduced fundamental changes in our ideas of time and space. In 1911 Rutherford introduced the greatest change in our idea of matter since the time of Democritus. The reception of these two changes was curiously different. The new ideas of space and time were regarded on all sides as revolutionary; they were received with the greatest enthusiasm by some and the keenest opposition by others. The new idea of matter underwent the ordinary experience of scientific discovery; it gradually proved its worth, and when the evidence became overwhelmingly convincing it quietly supplanted previous theories. No great shock was felt. And yet when I hear today protests against the Bolshevism of modern science and regrets for the old-fashioned order, I am inclined to think that Rutherford, not Einstein, is the real villain of the piece. When we compare the universe as it is now supposed to be with the universe as we had ordinarily preconceived it, the most arresting change is not the rearrangement of space and time by Einstein but the dissolution of all that we regard as most solid into tiny specks floating in void. That gives an abrupt jar to those who think that things are more or less what they seem. The revelation by modern physics of the void within the atom is more disturbing than the revelation by astronomy of the immense void of interstellar space.

The atom is as porous as the solar system. If we eliminated all the unfilled space in a man's body and collected his protons and electrons into one mass, the man would be reduced to a speck just visible with a magnifying glass.

This porosity of matter was not foreshadowed in the atomic theory. Certainly it was known that in a gas like air the atoms are far separated, leaving a great deal of empty space; but it was only to be expected that material with the characteristics of air should have relatively little substance in it, and "airy nothing" is a common phrase for the insubstantial. In solids the atoms are packed tightly in contact, so that the old atomic theory agreed with our preconceptions in regarding solid bodies as mainly substantial without much interstice.

The electrical theory of matter

which arose towards the end of the nineteenth century did not at first alter this view. It was known that the negative electricity was concentrated into unit charges of very small bulk; but the other constituent of matter, the positive electricity, was pictured as a sphere of jelly of the same dimensions as the atom and having the tiny negative charges embedded in it. Thus the space inside a solid was still for the most part well filled.

But in 1911 Rutherford showed that the positive electricity was also concentrated into tiny specks. His scattering experiments proved that the atom was able to exert large electrical forces which would be impossible unless the positive charge acted as a highly concentrated source of attraction; it must be contained in a nucleus minute in comparison with the dimensions of the atom. Thus for the first time the main volume of the atom was entirely evacuated, and a "solar system" type of atom was substituted for a substantial "billiard-ball". Two years later Niels Bohr developed his famous theory on the basis of the Rutherford atom, and since then rapid progress has been made. Whatever further changes of view are in prospect, a reversion to the old substantial atoms is unthinkable.

The accepted conclusion at the present day is that all varieties of matter are ultimately composed of two elementary constituents—protons and electrons. Electrically these are the exact opposites of one another, the proton being a charge of positive electricity and the electron a charge of negative electricity. But in other respects their properties are very different. The proton has 1840 times the mass of the electron, so that nearly all the mass of matter is due to its constituent protons. The proton is not found unadulterated except in hydrogen, which seems to be the most primitive form of matter, its atom consisting of one proton and one electron. In other atoms a number of protons and a lesser number of electrons are cemented together to form a nucleus; the electrons required to make up the balance are scattered like remote satellites of the nucleus, and can even escape from the atom and wander freely through the material. The diameter of an electron is about 1/50,000 of the diameter of an atom; that of the nucleus is not

very much larger; an isolated proton is supposed to be much smaller still.

Thirty years ago there was much debate over the question of aether-drag—whether the earth moving round the sun drags the aether with it. At that time the solidity of the atom was unquestioned, and it was difficult to believe that matter could push its way through the aether without disturbing it. It was surprising and perplexing to find as the result of experiments that no convection of the aether occurred. But we now realize that the aether can slip through the atoms as easily as through the solar system, and our expectation is all the other way.

Science News-Letter, May 25, 1929

Science Outrunning Ethics

Philosophy

DR. CARL BARUS, in a letter to the American Philosophical Society:

"The dilemma of our present civilization is that its advance in ethics and esthetics is not comparable with its advance in science. I am by no means sure that to teach the people at large more science will not do more harm than good. Science lends itself to the arts of war, of aggression, of exploitation, of sabotage, quite as much as to the arts of peace."

Science News-Letter, May 25, 1929

Still Work for Diogenes

Philosophy

DR. F. W. CLARKE, in a letter to the American Philosophical Society:

"The world's intellectual need seems to me to be a more general development of intellectual honesty."

Science News-Letter, May 25, 1929

No Snake Suicides

Zoology

KARL P. SCHMIDT, in *The Truth About Snake Stories* (Field Museum):

It is widely believed that rattlesnakes when confined, and especially if tortured, will strike themselves and thus commit suicide. All available information, however, indicates that snakes are immune to their own venom, and in experiments I have made personally, causing a rattler to bite himself, there was no visible effect. There is a foundation for the story in the fact that a snake, if sufficiently excited, will lash out in every direction and may then catch his fangs on one of his coils. The Blow Snake, when going into the convulsion preceding its death-feint, frequently catches its fangs on its own body.

Science News-Letter, May 25, 1929

FIRST GLANCES AT NEW BOOKS

MENTAL HYGIENE—Frankwood E. Williams—*American Library Association* (cloth, 50 cents; paper, 35 cents). This is No. 16 of the Reading with a Purpose Series, a guide to readers of the best books on various subjects. The author of the booklet is medical director of The National Committee for Mental Hygiene. The books recommended in this course of reading are: Social Aspects of Mental Hygiene, Frankwood E. Williams and others, Yale University Press, 1925, \$1.60; The Problem Child at Home, Mary Buell Sayles, Commonwealth Fund, Division of Publications, 578 Madison Avenue, N. Y., 1928, \$1.50; Everyday Problems of the Everyday Child, Douglas A. Thom, Appleton, 1927, \$2.50; Outwitting Our Nerves, Josephine A. Jackson and Helen M. Salisbury, Century, 1921, \$2.50; Psychology of Insanity, Bernard Hart, Macmillan, 1920, \$1.00.

Hygiene
Science News-Letter, May 25, 1929

THE STRUGGLE FOR HEALTH—Richard H. Hoffmann—*Liveright* (\$3.50). The descriptive title does not adequately indicate the intriguing nature of this history of medicine. An entirely new viewpoint and refreshing style will hold the reader's interest throughout. Dr. Hoffman has woven piquant, little-known incidents into his tale and his imagination adds many vivid, entertaining details which, if not strict history, are in accord with the generally accepted theories. The book can be highly recommended to the layman for pleasurable as well as profitable reading. The chapter headings give a good idea of the style: "From Myth and Magic to Moses", "Office Hours in Rome", "The Skeleton Comes Out of the Closet", "Heart Interest and Circulation", "Science Lays Its Egg", and "The Kindest Cut of All" are a few.

Medical History
Science News-Letter, May 25, 1929

COMMUNITY HYGIENE—Dean Franklin Smiley and Adrian Gordon Gould—*Macmillan* (\$2). This book is designed for college students. The authors hope to give the leading citizens of tomorrow a comprehensive outline of some of the important problems they will face.

Hygiene
Science News-Letter, May 25, 1929

THE ROAD TO OREGON—W. J. Ghent—*Longmans, Green*—(\$5). The wild and woolly West has been so befogged by fiction and so overplayed by local patriotism that it is time that the searchlight of a sincere and cautious historian should be turned upon this important and misinterpreted period of our national history. Mr. Ghent is just the man to write "A Chronicle of the Great Trail", for he is a Westerner by birth and he combines a sympathetic appreciation of the hardships and triumphs of the pioneers with a sharp, critical judgment that gives him the power to pierce through the exaggerations of the dime-novel type of biographers and travelers. He has gone back to the fundamental facts wherever possible, giving actual names and figures of the pony express and stagecoach traffic, and enlivening the narrative by the description and pictures of contemporaries. We owe it to the Oregon trail that we now have a nation that stretches from sea to sea, and its importance should be recognized in the teaching of history. The younger generation should not be left to get their idea of the national highway from movies, like "The Covered Wagon" with its ridiculous prairie schooners and its scandalous caricature of Jim Bridger. Clubs and classes all along the line from Independence, Mo., to Vancouver will find this a good book for their next season's study.

History
Science News-Letter, May 25, 1929

THE SOVIET UNION—*Soviet Union Information Bureau* (\$1.50). As an up-to-date handbook to the Soviet Union, still the great unknown in politics and national relations, this book performs a service. Scientifically inclined persons will be particularly interested in the chapters on patents, public health, education, science and the society for cultural relations.

Geography
Science News-Letter, May 25, 1929

CIRCLING SOUTH AMERICA—Isabel Anderson—*Marshall Jones* (\$4). A pleasantly written account of a voyage with many inland excursions by a seasoned traveler. Mrs. Anderson takes a special interest in official and diplomatic aspects of the countries visited and her own past experiences as the wife of a diplomat abroad enable her to present this side of South American life from a vantage point.

Geography
Science News-Letter, May 25, 1929

ENGLISH AND SCIENCE—Philip B. McDonald—*Van Nostrand*—(\$2). A handbook devoted to the rare art of putting scientific papers into good English, meaning by that, making the meaning clear and convincing. The author, who teaches English in the College of Engineering of New York University, gives directions for presenting reports, oral and written, how to write good letters, how to avoid obscurity, pomposity and ornateness, and how to acquire "the difficult art of punctuation", and adds suggestions as to cultural readings in the history of science and invention.

General Science
Science News-Letter, May 25, 1929

THE CONFLICT BETWEEN RELIGION AND SCIENCE—John William Draper—*Appleton* (\$1). This ranks with White's "History of the Warfare of Science with Theology in Christendom" and Lecky's "History of Rationalism in Europe" in interest and is as timely as when it was first published fifty-five years ago, although some of the statements of all three of these pioneers in this field need correction through the researches of later historians such as Sarton. This edition in abridged form fits handily into the pocket.

History of Science
Science News-Letter, May 25, 1929

NOBEL, DYNAMITE AND PEACE—Ragnar Sohlman and Henrik Schück—*Cosmopolitan* (\$5). It is a hopeful commentary on literature and life that we have such a biography as this. No one can even glance through the life of Alfred Nobel without being inspired to do something for science. Perhaps his life properly known will promote science more widely than his prizes.

General Science
Science News-Letter, May 25, 1929

PEOPLES OF ASIATIC RUSSIA—Waldemar Jochelson—*American Museum of Natural History* (\$2.50). Ethnologists and those interested in allied sciences will be grateful to Prof. Jochelson for this valuable handbook. There are many racial elements in the region with which the book deals, but the author patiently straightens out the complexities and gives us the facts of population, migrations, languages, somatology, customs, art, etc., about each group. There are 52 illustrations and a number of maps.

Ethnology
Science News-Letter, May 25, 1929

First Glances at New Books—Continued

TREES AND FORESTS OF THE WESTERN UNITED STATES—E. J. Hanzlik—*Author* (\$2.50). Although written primarily for lumbermen and timber owners, this book can serve a useful purpose in the high school or college library and in the hands of any one who has occasion to walk the western woods.

Dendrology

Science News-Letter, May 25, 1929

WHIP SNAKES AND RACERS—A. I. Ortenburger—*U. of Mich.* (\$6). A detailed monograph on two neglected and useful serpents, about which many tall and mostly slanderous tales have been told. The half-tone illustrations are for the most part above criticism, and the distribution maps are clear and definite.

Herpetology

Science News-Letter, May 25, 1929

A HANDBOOK OF THE DRAGONFLIES OF NORTH AMERICA—J. G. Needham and Hortense B. Heywood—*Thomas* (\$7). This book is not designed for the elementary student, but for the entomologist who is "going into" the dragonflies in some detail. For such an one it will be indispensable. Its synopses are clear and terse, and its line illustrations of analytical characters are gratifyingly numerous and well drawn.

Entomology

Science News-Letter, May 25, 1929

TYPICAL FLIES: A PHOTOGRAPHIC ATLAS OF DIPTERA—F. K. Pearce—*Cambridge Univ. Pr.* (\$3.25). A collection of 162 half-tone illustrations, mostly of typical dipterous insects, but including a few habitat pictures. This book will be extremely useful to the dipterologist.

Entomology

Science News-Letter, May 25, 1929

ADDITIONS TO THE PALAEONTOLOGY OF THE PACIFIC COAST AND GREAT BASIN REGIONS OF NORTH AMERICA—Remington Kellogg and others—*Carnegie* (\$3). A group of palaeontological papers on various subjects: a fossil whale, a fossil bear, fossil plants, and the geology and palaeontology of the Crooked River Basin.

Paleontology

Science News-Letter, May 25, 1929

THE RATE OF LIVING—Raymond Pearl—*Knopf* (\$3.50). An exact and critical study of life duration, conducted with *Drosophila melanogaster* as the "sample organism".

Biology

Science News-Letter, May 25, 1929

FIELD BOOK OF INSECTS—F. E. Lutz—*Putnam* (\$2.50). A conveniently arranged book containing notes and keys to help in the identification of insects, as well as splendid illustrations, many in color. An entomological index, and a habitat and plant index make it a useful book for any entomologist to slip in his pocket.

Entomology

Science News-Letter, May 25, 1929

THE FISHES OF THE SERIES CAPRIFORMES, SHIPIFORMES, AND SQUAMIPENNES, COLLECTED BY THE UNITED STATES BUREAU OF FISHERIES STEAMER "ALBATROSS", CHIEFLY IN PHILIPPINE SEAS AND ADJACENT WATERS—H. W. Fowler and B. A. Bean—*Govt. Printing Off.* (60c). Of interest to students of systematic ichthyology.

Ichthyology

Science News-Letter, May 25, 1929

FORTY-THIRD ANNUAL REPORT OF THE BUREAU OF AMERICAN ETHNOLOGY—*Government Printing Office* (\$2.75). Five papers accompany this report: "The Osage Tribe: Two Versions of the Child-naming Rite," by Francis La Flesche; "Wawenock Myth Texts from Maine," by Frank G. Speck; "Native Tribes and Dialects of Connecticut, a Mohegan-Pequot Diary," by Frank G. Speck; "Picuris Children's Stories," by John P. Harrington and Helen H. Roberts; "Iroquoian Cosmology—Second Part," by J. N. B. Hewitt.

Ethnology

Science News-Letter, May 25, 1929

POTS AND PANS—H. S. Harrison—*Morrow* (\$1). The history of ceramics, its development in primitive camps and in centers of civilization, is the latest addition to the series of little books on "The Beginning of Things."

Ethnology—Technology

Science News-Letter, May 25, 1929

NEW YEAR'S DAY—S. H. Hooke—*Morrow* (\$1). The evolution of calendar systems in various parts of the world explained concisely. Another of the series on "The Beginning of Things."

Ethnology

Science News-Letter, May 25, 1929

QUEER FISH—C. M. Yonge—*Brennan's* (\$2.50). A book about British fish and fisheries, but inclusive enough to be well worth a place on the biological reading table on this side of the Atlantic.

Biology

Science News-Letter, May 25, 1929

THE LAST HOME OF MYSTERY—E. Alexander Powell—*Century* (\$4). Nepal, hidden in a pocket of the Himalayas, jealously guards its independence, and has been visited by few Europeans. It has magnificent temples to weird gods, and a civilization like that of India. Colonel Powell has Marco Polo's knack of seeing and relating astounding tales—which are true.

Geography

Science News-Letter, May 25, 1929

PLEASANT DAYS IN SPAIN—Nancy Cox-McCormack—*Sears* (\$3.50). An intimate, chatty style distinguishes this from the average travel book. One sees—not only scenery and architecture, but the hospitable, leisurely people of this colorful country. It is interesting to note that King Alfonso awarded to the author the cross of merit in recognition of this book.

Geography

Science News-Letter, May 25, 1929

THE BUREAU OF BIOLOGICAL SURVEY—Jenks Cameron—*Johns Hopkins Press* (\$2). The Institute for Government Research has performed an important function in gathering into accessible volumes the histories, activities, organizations, and laws relating to the various government bureaus and establishments. Birds, animals, and other wild life come under the guardianship of the Biological Survey; how this organization has functioned and what it has done form an important chapter in American science.

Biology

Science News-Letter, May 25, 1929

THE BUREAU OF ENGRAVING AND PRINTING—Laurence F. Schmeckebeier—*Johns Hopkins Press* (\$1.50). Everyone has use for the product of the bureau analyzed and described in this historical and organizational summary compiled by the Institute for Government Research.

Government

Science News-Letter, May 25, 1929

PARENTS AND THE PRE-SCHOOL CHILD—William E. Blatz and Helen Bott—*Morrow* (\$3). Written for the parents of the normal child and based on first-hand experience with normal children is this guide for training the young child. Part I is primarily intended for parents and Part II for professional workers. Part III contains the chart and record forms in use at the St. George's School for Child Study. The book will also be helpful for child study groups to follow.

Psychology

Science News-Letter, May 25, 1929